

Ch 5/22 Practice Multiple Choice Test Questions

- Which of the following statements about gases is false?
 - Gases are highly compressible.
 - Distances between molecules of gas are very large compared to bond distances within molecules.
 - Non-reacting gas mixtures are homogeneous.
 - Gases expand spontaneously to fill the container they are placed in.
 - All gases are colorless and odorless at room temperature.
- Pressure can be measured in a variety of units.
 $1 \text{ atm} = 760 \text{ mmHg (torr)} = 101.3 \text{ kPa}$
If you wanted to use units of kPa in your ideal gas law equation, what is the value of R that you should use in the equation?
 - 0.0821
 - 22.4
 - 62.4
 - 8.31
 - 7.5
- An open-end manometer filled with a liquid with which density shown below will exhibit the smallest height difference for a given gas pressure in the bulb.
 - 13.6 g/ml
 - 2.29 g/ml
 - 18.2 g/ml
 - 0.0826 g/ml
 - 0.0918 g/ml
- In a Torricelli barometer, a pressure of one atmosphere supports a column of mercury. If the original tube containing the mercury is replaced with a tube having twice the diameter of the original, what will the height of the mercury column be at one atmosphere pressure?
 - 380 mm
 - 760 mm
 - 1520 mm
 - 4780 mm
 - 121 mm
- Which statement about ideal gases is false?
 - Smaller molecules behave more ideal.
 - Gases with strong IMF's between gas molecules behave more ideal.
 - High temperatures make gases behave more ideal.
 - 2 L containers of both CO_2 and O_2 at STP will contain the same number of molecules.
 - Low pressures make gases behave more ideal.
- If 3.21 mole of a gas occupies 56.2 L at some temperature and pressure, 5.29 mole of this gas will occupy what volume under these same conditions.
 - 606 mL
 - 1.65 L
 - 34.1 L
 - 92.6 L
 - You can not determine the volume without knowing the temperature and pressure.
- If 50.75 g of a gas occupies 10.0 L at STP, 129.3 g of this gas will occupy what volume at STP?
 - 3.92 L
 - 50.8 L
 - 12.9 L
 - 25.5 L
 - 5.08 L
- According to kinetic molecular theory, molecules of different gases at the same temperature always have the same
 - average kinetic energy
 - molecular mass
 - pressure
 - molecular speed
 - average density
- When 100 ml of nitrogen gas is added to 150 ml of hydrogen gas and reacted to form ammonia, as in the equation below, at a constant temperature and pressure, what volume of ammonia will be produced?
$$\text{N}_{2(\text{g})} + 3 \text{H}_{2(\text{g})} \rightarrow 2 \text{NH}_{3(\text{g})}$$
 - 350 ml
 - 250 ml
 - 200 ml
 - 100 ml
 - Can not determine the volume without more temperature and pressure information.
- What is the temperature of 0.444 mole of CO gas in a 11.8 L container at 889 torr.
 - 106°C
 - 73°C
 - 14°C
 - 32°C
 - 379°C
 - 652°C
- Each in their own 3.0 L container at 20°C that contains 5 g of gas, which gas will have the greatest pressure?
 - He
 - Ne
 - Ar
 - Kr
 - They will all have the same pressure because they are all monatomic noble gases.
- The volume of a 2.49 g sample of gas was 752 ml at 1.98 atm and 62°C. The gas is
 - SO_2
 - SO_3
 - NH_3
 - NO_2
 - Ne
- Determine the molar mass of a gas that has a density of 6.7 g/L at STP.
 - 496 g/mole
 - 150 g/mole
 - 73.0 g/mole
 - 3.35 g/mole
 - 0.298 g/mole
- Automobile air bags use the decomposition of sodium azide as their sources of gas for rapid inflation, represented in the reaction below. What mass of NaN_3 is required to provide 40.0 L of N_2 at 25°C and 763 torr?
$$2 \text{NaN}_{3(\text{s})} \rightarrow 2 \text{Na}_{(\text{s})} + 3 \text{N}_{2(\text{g})}$$
 - 16.4 g
 - 1.09 g
 - 160 g
 - 71.1 g
 - 107 g
- Potassium chlorate can be decomposed to produce a oxygen gas in the laboratory by the reaction below. What volume of dry oxygen gas at 25°C and 1.00 atm pressure is produced by the decomposition of 7.5 g of $\text{KClO}_{3(\text{s})}$?
$$2 \text{KClO}_{3(\text{s})} \rightarrow 2 \text{KCl}_{(\text{s})} + 3 \text{O}_{2(\text{g})}$$
 - 4.5 L
 - 7.5 L
 - 2.2 L
 - 3.7 L
 - 11 L
- Determine the total pressure in a 12.2 L vessel that contains 2.34 g of carbon dioxide, 1.73 g of sulfur dioxide, and 3.33 g of argon, at 42°C.
 - 263 mmHg
 - 134 mmHg
 - 395 mmHg
 - 116 mmHg
 - 0.347 mmHg

17. A gas mixture of Ne and Ar has a total pressure of 4.00 atm and contains 16.0 moles of gas. If the partial pressure of Ne is 2.75 atm, how many moles of Ar are in the mixture?
- 5.00 moles
 - 6.75 moles
 - 9.25 moles
 - 11.0 moles
 - 12.0 moles

18. Which statement below is not part of the kinetic molecular theory?
- Gases consist of large amounts of particles that are in continuous, random motion.
 - The volume of the gas particles is negligible compared to the total volume of the gas as a whole.
 - Attractive and repulsive forces between gas molecules vary for different gases.
 - Collisions between gas particles are perfectly elastic.
 - At a given temperature all gases have the same average kinetic energy.

19. According to the kinetic molecular theory, if the temperature of a gas were raised from 100°C to 200°C, the average kinetic energy if the gas will
- double
 - increase by a factor of 1.27
 - increase by a factor of 100
 - decrease by half
 - decrease by a factor of 100
 - remain the same

20. Of the following gases, which will have the greatest rate of effusion at a given temperature?

- CH₄
- NH₃
- Ar
- HBr
- HCl

21. Which of the following gases would have the highest average kinetic energy at 25°C?

- O₂
- N₂
- CO₂
- CH₄
- They all would be the same.
- It can not be compared unless the pressure and volume measurements were known

22. A real gas will behave most like an ideal gas under conditions of

- high temperature and high pressure
- high temperature and low pressure
- low temperature and high pressure
- low temperature and low pressure
- STP

23. Which noble gas is expected to show the largest deviations from the ideal gas behavior?

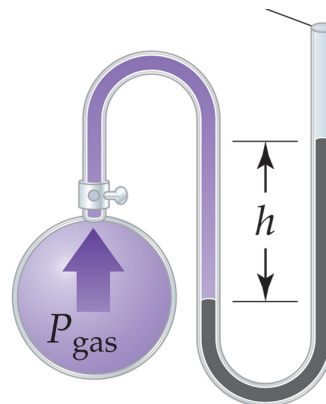
- helium
- neon
- argon
- krypton
- xenon

24. In van der Waals equation, the constants a and b _____

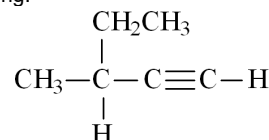
- are used to correct for the fact that as molecules do not travel in straight lines due to the collisions it makes with other molecules.
- are equal to each other for any real gas
- are used to correct for the difference between Celsius and Kelvin
- are used to correct for the size of gas molecules and the attractive forces between gas molecules.
- are used to correct for the fact that light gases travel faster than heavy gases

25. The atmospheric pressure is 750 mm Hg. Determine the pressure of the gas in the bulb attached to the open-end manometer in the picture below in which $h = 300$ mm.

- 300 mmHg
- 450 mmHg
- 750 mmHg
- 1050 mmHg
- 1200 mmHg

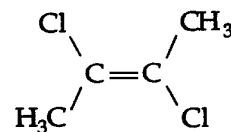


26. Name the following:



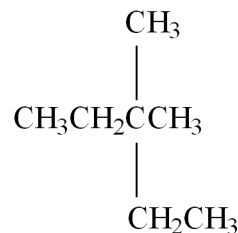
- 1-hexyne
- 2-ethynyl butane
- 2-ethyl-3-butyne
- 3-methyl-1-pentyne
- 3-methyl-4-pentyne

27. Name the following:



- 2-chloro-3-chloro-*cis*-2-butene
- 2,3-dichloro-*cis*-2-butene
- 2,3-dichloro-*trans*-2-butene
- 1-chloro-1-methyl-2-chloro-propene
- 2,3-dichloro-1-methyl-propene

28. Name the following:



- n*-heptane
- 2-methyl-2-ethylbutane
- 3,3-dimethylpentane
- 2,2-diethylpropane

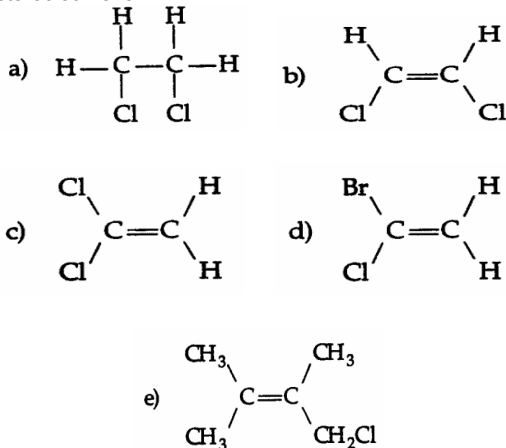
29. How many isomers of C₃H₈ are there?

- 1
- 2
- 3
- 5
- 6

30. In lecture, the professor named a molecule 4-ethylpentane. An alert student pointed out that although the correct structure could be drawn, the name did not follow systematic rules. What is the correct systematic name for the molecule?

- A) 2-ethylpentane
- B) 1-methyl-1-propylpropane
- C) 3-methylhexane
- D) 4-methylhexane
- E) none of these (a-d)

31. Which of the following compounds can exhibit stereoisomerism?



32. Which of the following types of compounds must have an sp^2 -hybridized carbon center?

- A) ethers
- B) ketones
- C) alcohols
- D) alkanes
- E) amines

33. Consider the molecule *trans*-2-butene. Which statement is true?

- A) The molecule has two π bonds.
- B) There is free rotation around every bond in the molecule.
- C) *Cis*-2-butene is its structural isomer.
- D) Carbon #2 exhibits sp^2 hybridization.
- E) none of the above

34. Oxidation of 2-methyl-1-butanol could yield

- A) 2-methyl-butanone
- B) 2-methyl-1-butanol
- C) 2-methylbutanoic acid
- D) both b and c
- E) both a and c

35. Oxidation of a primary alcohol results in a(n) _____ and oxidation of a secondary alcohol results in a(n) _____.

- A) carboxylic acid, amine
- B) aldehyde, ketone
- C) ester, ether
- D) ketone, aldehyde
- E) amine, carboxylic acid

36. The boiling point of methanol is much higher than that of ethane.

This is primarily due to

- A) the difference in molar masses of methanol and ethane.
- B) the hydrogen bonding in methanol.
- C) the significant molecular size difference between methanol and ethane.
- D) the carbon oxygen double bond in the methanol.
- E) none of these

Answer Key

1	E	7	D	13	B	19	B	25	D	31	B
2	D	8	A	14	D	20	A	25	D	32	B
3	C	9	D	15	C	21	E	27	C	33	D
4	B	10	A	16	A	22	B	28	C	34	E
5	B	11	A	17	A	23	E	29	B	35	B
6	D	12	D	18	C	24	D	30	C	36	B